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# PHYSIOLOGY AND HEALTH

NUMBER ONE



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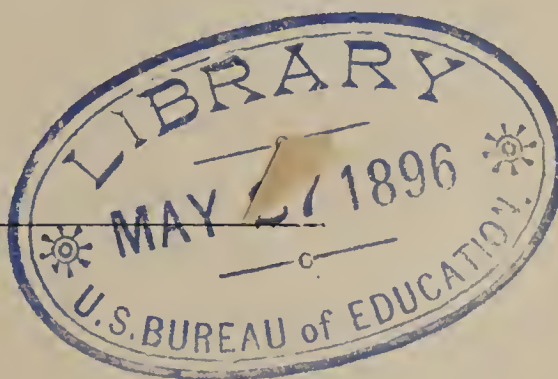
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PHYSIOLOGY AND HEALTH

NUMBER ONE

FOR PRIMARY CLASSES

STUDIES OF THE HUMAN BODY AND OF THE EFFECTS  
OF ALCOHOLIC DRINKS AND NARCOTICS  
UPON LIFE AND HEALTH

65908



PHILADELPHIA

E. H. BUTLER & CO.

## ANNOUNCEMENT.

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MESSRS. IVISON, BLAKEMAN, AND COMPANY having published, under our advice and supervision, the Union Series of Text-Books on Physiology and Health, comprising—

- I. — No. 1. — For Primary Classes.
- II. — No. 2. — For Intermediate Classes.
- III. — No. 3. — For Secondary Classes.

We take great pleasure in endorsing the same, and in recommending their use as School Text-Books. They not only teach the important truths demanded by recent legislation, but teach them in language adapted to the comprehension of the grade of pupils for which each book is specified.

MARY H. HUNT,

*National Supt. Dept. of Scientific Instruction of the  
Woman's Christian Temperance Union  
of the United States.*

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## PREFACE.

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MOST of our States and Territories now by law require that Physiology and Hygiene be taught in the Public Schools, with special reference to the effects of Alcoholic Drinks and other Narcotics on the human system. Many existing books, prepared to meet the demands of the first enactments on this subject, do not fulfill the requirements of more recent legislation. The present work is designed to teach the essential laws of health, and to comply fully with the most stringent provisions of the enactments requiring this subject taught, by conforming to their primary object, namely: To have the children instructed as to the nature of Alcoholic Drinks and other Narcotics, and the results of their use, and thus to forewarn them against the insidious poisons that are the constant cause of so much misery and crime.

As much of Anatomy and Physiology is taught as is necessary to this end. But these sciences do not usurp the space and time that belong to the more important aims contemplated by the requirements which this book is intended to meet.

The endeavor has been to make the physiological instruction clear and sufficient,—the Temperance teachings thorough, and as radical as the whole truth now revealed by modern scientific investigation.

The work throughout has been more or less prepared and wholly supervised by Mrs. Mary H. Hunt, the superintendent of the Department of Scientific Instruction of the National Woman's Christian Temperance Union, and the Advisory Committee of the same, to whom the publishers are under great obligations.

NEW YORK, August, 1889.



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# PHYSIOLOGY AND HEALTH.

## CHAPTER I.

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### INTRODUCTORY.

1. Did you ever keep a garden-plot? If so, you found that your flowers or vegetables did well when you took good care of them, and did ill when



you neglected them. If some other garden looked better than yours, it was because the owner knew better what to do for it, or worked



more than you did. Garden plants do not thrive without care.

2. Compare the lean and rough-coated horse



of your shiftless neighbor with the sleek, plump horse of a careful, thrifty man, and you will see that animals do not thrive without proper attention.

3. In the poorest streets of the city are many children with dull eyes and sallow faces, who,

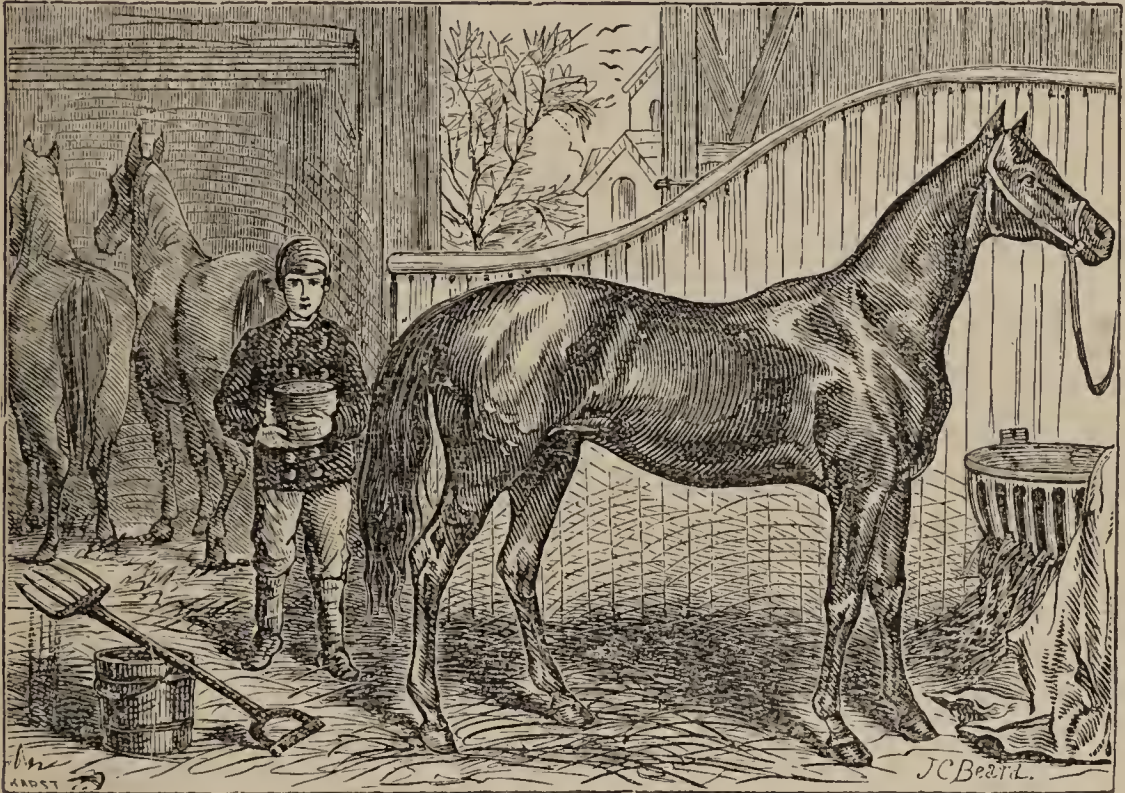
if properly clothed, fed, washed, and supplied with pure air, would be rosy and bright. Children do not thrive well without care.

4. To be well and strong, we must take care of our bodies. In order to take care of them, we must know what they need, what is good for them, and what will injure them.

5. Our appetites are intended to guide us, but they must not control us. The lower



animals are governed by their appetites, but human beings must be governed by reason. If we do not know how to take proper care of our bodies, we are in a worse condition than



any of the lower animals, for their appetites seldom lead them to do themselves any harm. Ours often lead us astray.

6. One of the most common ways of injuring the body is by the use of alcoholic drinks, tobacco, and other poisons. Many grown people even are ignorant of the effects of these substances. People often begin to use

them without knowing what harm they are doing themselves. This little book is intended to teach you how to take care of your health, and to point out to you the harm which comes from taking beer and other alcoholic drinks, and from smoking or chewing tobacco.



#### QUESTIONS.

I.—1. What are the effects of care and neglect on a garden-plot? 2. What are the effects of care and neglect on horses? 3, 4. What are their effects on children? 5. For what are our bodies intended? 6. What is one of the most common ways of injuring the body? What is the purpose of this book?



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CHAPTER II.

---

## OUR FOOD.

## I

1. Twice or three times a day you sit down at a table to eat and drink. Every one you know does the same thing. In our manufactories, workshops, and schools the noon bell is the signal for all to cease working and to go and eat. No matter how important the business or the study, it must wait while we eat our food.

2. People spend from one to two hours each day in eating and drinking, and sometimes more. It takes all the time of many cooks and housekeepers to prepare food. And the heads of families work hard every day to get money to buy what is needed for meals. We can state truthfully that a large share of the time and labor of the whole world is used in getting and preparing and eating food.

3. Do you know why we spend so much time in this way? You eat and drink because you are hungry and thirsty, and you enjoy it. Can you remember the time when you



were not hungry, and yet your friends urged you to eat something?

We all know that there are many things that we would enjoy eating, but we are not allowed to have them often. So it is not only because we are hungry, or for enjoyment, that we eat.

4. A tired mother would often omit to get dinner, and cooks would run away from the hot stove, and fathers would stop working many a day, if it were only for pleasure that we eat.

5. We must eat and drink to keep alive. Some people need little food and others need a great deal. But all must eat something every day. If we should stop eating, we would grow thin and weak and would die very soon. Persons have been known to live more than a month without eating, but most people would die in much less time than that.

## II

1. The most of our food grows from the ground. The warm sun shines and the rain falls on the earth, and the grain and the vegetables and the plants grow and ripen, and we gather and store them up.

### Grains.

2. Wheat, barley, corn, and oats are seeds. The farmer raises them, and stores a part to sow the following year, and the rest is taken



to the miller to be ground. From the wheat comes the flour that we make into loaves of bread. From corn and oats comes the meal that makes cakes and porridge. Pearl-barley we use in making soup.



3. The Chinese and Hindoos live mostly on rice. Rice is not often ground, but is boiled or made into a pudding. Rye and barley are good food; but the best of all the grains is wheat, and the finest bread is made from wheaten flour.

#### Vegetables.

4. Most people like potatoes. They are a wholesome and light food when boiled, baked or stewed; but fried potatoes are not good for every one, because of the fat in them. The

sweet potato grows in warm climates, and is rich in taste. It is heavier and less digestible than the white potato.

5. Turnips and beets are roots, like the potato, and are sweet and good.

6. Lettuce, spinach, celery, and other green vegetables are pleasant to the taste and healthful, but they do not of themselves give much strength.

7. If you had to choose the best two articles of vegetable food, you would select wheaten bread and the white potato, would you not? But it is better to have a variety.

8. Fruits do not contain much solid substance. They have a great deal of juice which is mostly water. If you had to live on fruit entirely, you would not grow fat or strong. But we all like apples, oranges, pears, grapes, and other fruits and berries. And they are very useful. It gives us pleasure to eat them, and they help us to digest other food.

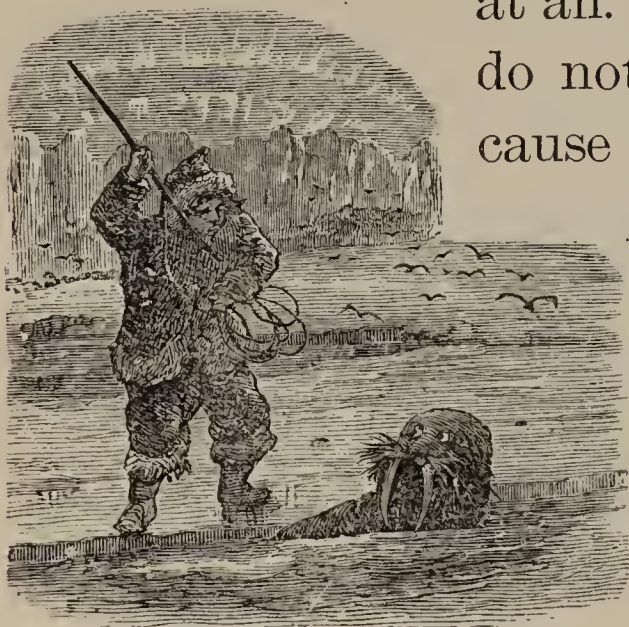
9. It is well to form the habit of eating a little fruit before breakfast. The old proverb says: "Fruit is *gold* in the morning, *silver* at noon, and *lead* at night." That means that



apples and some other fruits when eaten in the evening sometimes make a "lump in the stomach," and give us a restless night and bad dreams. Fruit that is not ripe should not be eaten at any time.

### Animal Food.

10. Once or twice a day is often enough to eat meat. In some countries they do not eat it at all. The natives of India



do not eat animal food, because they do not think it right to do so. Many people do not eat it because they cannot get it. It is more expensive than vegetable food. The Esquimaux, who live

near the North Pole, have to live chiefly on the meat of bears, walrus, and other animals during their long winters. But the people of those countries, where both animal and vegetable food is eaten, are larger and stronger than those who live on animal or vegetable food alone



11. The best meat to eat is beef. Mutton, poultry and game are good food. Pork is the meat used by many people during the winter months. It is not as healthful as beef.

12. Fish and oysters we get from the water, and are good when fresh but very bad when stale. The rule that we must not eat oysters in the months that have not an "r" in their names is a good one.

13. Eggs and milk are both animal foods. Eggs must be very good food; for the chick in the egg lives on it for many days before the shell breaks. Then you will find nothing left of the yolk and white of the egg. It has all gone into the chick, which then needs another kind of food.

14. Babies live on milk for months. Sick people often take nothing but milk. It has in it everything that is needed to make the body grow.



### Mineral Food.

15. We have to eat a good deal of mineral food. Our bones, for example, are partly made of lime, and we must have lime in our food to keep the bones in good repair and to make them grow. But we could not eat pure lime itself. The lime that we eat is found in our bread and milk, meat and potatoes, and other food. You cannot see it or taste it, because there is very little of it, and it is really a part of the food. But it is certainly there; we could not live if we did not have it.

16. Salt is the only mineral that we eat pure.

### III

#### Cooking.

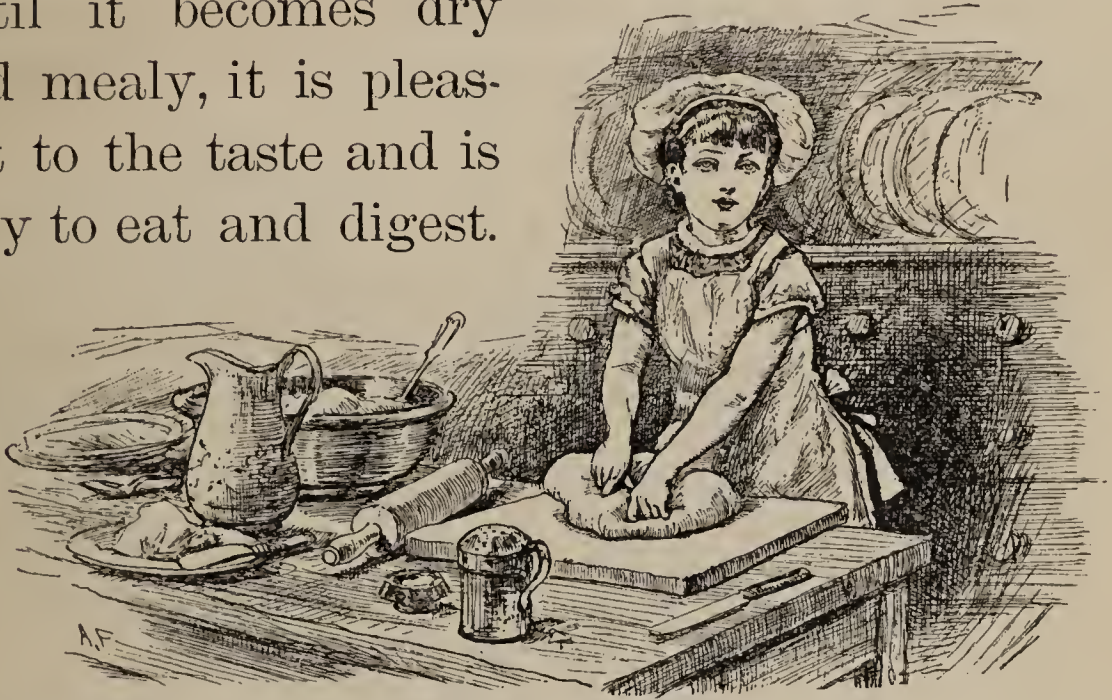
1. Why do we cook our food? It takes a great deal of time. Why do we not eat it raw, as animals do?

2. Much of our food we could not eat, if it were not cooked. You would find it difficult to eat meal and flour in that way. And if you succeeded in swallowing a little, it would make your stomach feel badly. A raw potato



would be hard and coarse. Raw beef can be eaten, but it is very tasteless.

3. When the flour is made into light and delicate bread, and when the potato is boiled until it becomes dry and mealy, it is pleasant to the taste and is easy to eat and digest.



Beef gives out an agreeable smell, and tastes well when nicely roasted or broiled. Cooking makes quite a change in these and many other articles of food.

4. It is easy to spoil good food and make it unhealthful by bad cooking. A good cook can make common and cheap food very wholesome. All girls should learn something about cooking food. A cooking-stove is a more useful thing than a piano.

5. Work that helps to make the children

grow, and to keep the grown folks well and happy, is surely worth time and attention.

6. We should eat to live, and not live to eat. Any one who eats his food merely for enjoyment makes a mistake. He is likely to eat and drink things that are too rich for his stomach, and to cause it some injury.

7. It is foolish and wicked to eat and drink that which does us harm, for the sake of the pleasure it gives us. Very many people injure themselves in this way by using intoxicating drinks.



#### QUESTIONS.

**I.** — 1, 2, 3. Why do we spend so much time eating and drinking? 4. Do we eat merely for pleasure? 5. Can we safely go without eating? Do all need to eat the same?

**II.** — 1. Where does most of our food come from? 2, 3. What grains do we eat? 4, 5. What vegetables do we eat most of? 6. What green vegetables are pleasant and healthful? 7. What are the two best articles of vegetable food? 8, 9. What is the chief use of fruits as food. 10. What is the chief use of animal food? 11. What meats are best to eat? 12. What is said of fish and oysters? 13. Of eggs? 14. Of milk? 15. What is the use of mineral food?

**III.** — 1, 2, 3. Why do we cook our food? 4, 5. Why should all girls learn to cook? 6, 7. What is the best rule for eating?



## CHAPTER III.

## DRINKS.



1. What is more beautiful than pure water? And what is more delicious when one is thirsty! It is dreadful to be starving and have nothing to eat, but it is worse to be very thirsty and have nothing to drink. You would hardly believe me if I should tell you how much water there is in your body. But you know that you cannot eat anything unless you first chew it, and mix it with water in

your mouth. You know, too, that the blood which flows in every part of your body consists chiefly of water. If we could obtain no water our blood would become thick, our skins would grow dry and leathery, and we should soon die. Water is the best of drinks; and because it is so necessary to us, Nature makes us crave it and enjoy it.

2. Good water may become bad. You would not drink water that had a bad taste or bad smell. You would not drink water that was dirty or had anything distasteful in it.

3. But water may be perfectly clear and sparkling; it may have no foul taste or smell, and still be bad. When water runs near a drain, or cess-pool, or barn-yard, the settlings from these places may soak through the earth and mix with the water, and make it bad without making it look or smell or taste bad.

4. People sometimes poison themselves with bad water without knowing it. The only safe way is to have the barn-yard and cess-pool far away from the well and water-pipes, and to be sure that the drain does not leak.

5. Water sometimes gets poisoned by the



lead-pipes through which it runs. It does not look or taste different, and people go on drinking it until they begin to be sick. They



commonly have some pain in the stomach, and sometimes they become paralyzed.

6. Milk, besides being good for food, is a very refreshing drink. A glass of milk with meals is better than a glass of ice-water.

7. Hot coffee and tea are used by grown people, and sometimes they are given to children. But this is not right. Children do not need hot drinks with their food if they are well, and coffee and tea are not good for their stomachs and their nerves.

8. Chocolate and cocoa are better than tea and coffee for children. Sometimes a child who is not well needs a warm drink with

meals. "Cambric tea" (milk and hot water sweetened) is very good for such children.

9. Lemonade is refreshing in hot weather, and is wholesome. The juices of other fruits are used to make drinks, which have a pleasant flavor and do no harm. Soda water is a favorite drink. It is sparkling and pleasant, but the sweet syrups which are used in it leave one as thirsty as before, and we cannot always be sure that they are pure.

10. Other drinks, which are poisonous, are used by many people, and may seem pleasant at first. Such drinks have many different names,—cider, beer, wine, whisky, gin, brandy, etc. But they are all alike in one thing. They all contain alcohol, and it is the alcohol in them that makes them injurious.

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#### QUESTIONS.

I.—1. Why do we need to drink? What is the best drink? 2, 3. How may water become impure? 4. How may we best keep water pure? 5. How is water poisoned by lead-pipes? 6. What animal food is both meat and drink? 7. Should children drink coffee and tea? 8. Chocolate? 9. Lemonade and fruit drinks? Soda water? 10. Compare these with harmful poisonous drinks.

## CHAPTER IV.

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### ALCOHOLIC DRINKS.

#### Cider.

1. Green apples are hard and sour. They will be apt to make you sick if you try to eat them. But ripe apples are softer, their juice has a sweeter flavor, and they are good to eat.

2. Sometimes men put their apples to a bad use by making them into a drink, called cider. They grind or crush them, and press out the juice, and let it stand in barrels or tubs. Apple-juice, when treated in this way, quickly changes to a dangerous drink.

3. What makes it change? Something that is called a ferment. You cannot see a ferment with the naked eye, it is so very small.

4. If you ever looked through a microscope, you saw that it made a tiny speck of dust look very large. Men have seen the ferments by looking at them through the microscope, and have watched what they do.



5. In this way it has been found that the ferments are so light and small that they



can float in the air, and that they often rest on the skins or stems of fruit, though we do not see them with the naked eye.

6. When the juice of the apple is pressed out, these ferments at once get into it and change it. They do this by turning the sugar of the juice into something else.

7. How does sugar get into the apple-juice?

No one puts it in as you put sugar into your “cambric tea,” but as the apples ripen the sugar forms in them. The sweetest and ripest apples have the most sugar in their juices.

8. When the juice of apples is pressed out, the ferments turn the sugar into a gas\* that bubbles out to the air, and into a clear liquid that stays in the cider. That clear liquid is called alcohol. It is a poison. It makes the cider a poison.

9. A poison may not quickly kill a person who takes only a little at first. But it is the nature of a little poison to injure one’s health. Enough will kill whoever takes it.

10. Alcohol is a bad poison. It is its nature to make one who takes a little, in such a drink as cider, want more, and if he takes more he will want still more. It is the nature of alcohol to make a person not care if he does wrong. Often it makes those who drink it wish to do wicked and evil deeds.

11. Alcohol generally forms in cider in about six hours after the juice has been pressed out of the apples. If the weather is cold the fer-

\* Carbonic acid gas.

ments will not work as fast, and it will be longer before alcohol forms.

12. Each day after the cider is made, there will be more and more alcohol in it, as the ferments turn its sugar into that poison. The person who keeps on drinking cider each day after it is made, will get more and more alcohol. When the ferments have turned most of the sugar in the cider into alcohol, it is called "hard cider."

13. Ferments cannot change dry sugar into alcohol. They do not change the sugar in the apple-juice to alcohol while that juice stays in the apple.

14. There is no alcohol in apples or other fruits or vegetables as these ripen for us to eat. When apples decay or rot, they are not fit to eat. But this is not because there is alcohol in them. Their decay is not caused by the ferments that turn the sugar in cider into alcohol.

15. You have learned that the ripest and sweetest apples have the most sugar in their juices. Can you tell why more alcohol will form in the juice that has been pressed out



of ripe, sweet apples than in that from sourer or greener fruits?

16. Once people did not know that the ferments turn the sugar in the pressed-out apple-juice into alcohol. They did not understand that alcohol is a poison. They thought that as apples are good cider must be good also, but that is not true.

17. It is the nature of cider to make its drinkers want more. Cider has made many drunkards. It makes those who drink it cross and ugly-tempered, and often cruel and careless about doing right. You should not drink cider, because there is alcohol in it. If cider is left in a warm place long enough, the alcohol in it will turn to an acid. After that it is no longer called cider but vinegar. There is no alcohol in vinegar.



#### QUESTIONS.

I. — 1, 2. What poisonous drink is made of apples? 3, 4. What changes the apple-juice to a dangerous drink? 5, 6. How do the ferments act? 7. How does sugar get into the apple-juice? 8. How is the alcohol formed? 9, 10. What is the nature of alcoholic poison? 11, 12. Does the alcohol keep increasing in cider? What is hard cider? 15. What apples make the most alcohol? 16, 17. What is the effect of cider-drinking?.

CHAPTER V.

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## WINE — BEER — DISTILLED LIQUORS.

## I

## Wine.

1. As grapes ripen sugar forms in their juices, just as it does in the juice of apples.

2. Ripe grapes are a healthful fruit and very pleasant to eat. There is no alcohol in them. But if the juice of grapes is pressed out, the ferments will get in and will soon turn the sugar in such grape-juice to a gas that will pass in bubbles out of the liquid, and to alcohol that will stay in it. When the juice of grapes is pressed out it is called wine. The ferments will quickly turn the sugar in such a juice to alcohol.

3. Because alcohol is a poison, it makes the wine which contains it also a poison. Some wines are nearly one-quarter alcohol, others less. The more alcohol there is in any kind

of wine, the more poisonous it makes the wine.

#### Home-made Wine.

4. People sometimes make wine at home from grapes or berries, and think there is no alcohol in it because they put none in. They are mistaken; the ferments change the sugar to alcohol in the home-made wine as they do in other wines, and the alcohol makes it an unsafe drink.

5. It is the nature of wine, like that of cider, to make one who drinks it want more. The appetite for wine has led many people to ruin. If you never drink it at all, it can never hurt you.

#### Beer.

6. There is alcohol in beer.

7. Beer is made from grain, generally from barley. Grain is dry; it is mostly starch. It has no sweet juice to be squeezed out as grapes and other fruits have.

8. How can a drink that has alcohol in it be made from dry grain? It cannot until the starch in the grain is turned to sugar.

9. Barley, as you have learned, is a seed.



When it sprouts, its starch will turn to sugar. This sugar feeds the little roots and leaves of the new plant, until it is strong enough to get its food from the moist earth and air.

10. To make beer the brewer wets the grain, and keeps it warm and moist until a little sprout starts on each grain. If you should chew such a grain you would find it sweet, because its starch has turned to sugar. The brewer next heats it, so that all the little sprouts are killed. It is then called malt.

11. He mashes or grinds this malt, and soaks out its sugar in a good deal of water. This makes a sweet liquid. The brewer next puts in yeast, which is one kind of ferment. The yeast quickly changes part of the sugar to alcohol. The alcohol stays in the beer and makes it a poison that no one should drink. Hops are sometimes put in. They give the beer a bitter taste.

12. There is no alcohol in barley. This grain is sometimes made into pearl-barley to thicken soup. In some countries people grind barley and make it into bread and barley-cakes. When used in such ways it is a good food.

But when barley or other grain is made into beer, it is worse than wasted. There is enough alcohol in such beer to poison whoever drinks it.

13. It is the nature of beer to make those who drink it want more and more beer. It is also the nature of beer to make its drinkers dull, stupid, and wicked.

14. A boy who drinks beer will not be able to learn his lessons as well as one who never takes it at all. The beer will make his mind stupid. It will make him careless about doing right, and sooner or later it may lead him to do some very wicked deed.

Home-made Beer.

15. People sometimes boil roots, barks, and herbs in water, and when this cools they add sugar and yeast, and then let it stand in a warm place. In a little while froth and bubbles of gas will come to the top. Then we may know that the sugar in the liquid is being turned to alcohol. This is called "home-made beer." It is not a safe drink, because it has alcohol in it.

**Distillation.**

16. You have learned that it is the nature of the alcohol in beer, wine or cider to make those who drink it want more. To get the drinks that contain more alcohol, men heat cider, wine or beer until the alcohol in them turns to vapor. That vapor looks like steam, and rises above the heated liquor as steam rises above boiling water.

17. You have seen steam puff out from the spout of a tea-kettle. If you tried to catch the steam in a cold cup, you saw that it turned to drops of water. In the same way the vapor that passes out of the pipe of a kettle, when an alcoholic liquor is over the fire, will turn to drops of a liquor very strong with alcohol. In this manner brandy, rum, whisky and gin are made from such weaker liquors as wine, cider, and beer.

18. The process of making stronger alcoholic liquors, in this way, from weaker ones, is called distillation. Brandy, rum, whisky, and gin are about one-half alcohol. They are called distilled liquors. They ruin those who drink them more quickly than beer, wine, or



cider. But the drinker of beer, wine, or cider often gets just as much alcohol, because he drinks so much more.

### Alcoholic Appetite.

19. If you were asked what is one of the first bad things about a little alcohol in any liquor you would certainly answer, — “The power a little alcohol has to make a person want to drink more, until he drinks enough to ruin himself.” The person who cares so much for beer, cider, wine, or any other liquor that contains alcohol, and who keeps on drinking it, making himself stupid and drunken with it, is called a drunkard.

20. An appetite for alcoholic drinks is very hard to resist, and leads to sure ruin. Wine, brandy, cider or any liquor of this kind should never be put into puddings, sauces, jellies, pies, or any kind of food. It may lead those who take them to like alcoholic liquors.

## II

### Tobacco.

1. Nearly all boys and girls have seen plants growing. Some plants, like the cabbage or

lettuce, are good for food. Some others, like the grasses, we cannot eat, but they are good for horses, cows, and other animals. Still other plants contain poisons that will hurt or kill us if we take them.

2. Tobacco is a plant that contains a very strong poison. The leaves of the tobacco-plant when dried are unwisely used by many people for chewing, smoking, and sometimes snuffing.

3. Cigars and cigarettes are made from the dried leaves of the tobacco-plant.

4. A little baby was once killed by breathing the air in a tobacco manufactory, where its mother worked at making cigars. Grown men and women are often at first made sick by breathing the poisoned air of such places. After a time it does not make them so sick, but it slowly injures their health.

5. Perhaps you may ask, does not the poison in the tobacco harm those who smoke or chew it? It does harm them, and often very much. Chewing and smoking tobacco gives people heart-disease. It poisons their nerves and makes their minds stupid and dull, besides injuring them in other ways.

6. It often makes boys and others who use it want to drink alcoholic liquors.

7. It may seem strange that people will use a plant that does so much harm. But they do not know or stop to think how bad tobacco is when they begin using it. When they have formed the habit of using tobacco, it is very difficult to stop.

### Opium.

8. You have all seen poppies growing in the flower-bed. You remember how the bright petals of the poppy-flower fall off after a time, and the seed-pod is left on the stalk.

9. This seed-pod contains a milky juice that will come out if the pod is cut in the right way. This juice when dry is called opium. Opium, like alcohol and tobacco, is a poison that deadens the nerves. For this reason the doctor sometimes gives sick people opium to quiet pain. It deadens their nerves, and they do not feel the pain.

10. Opium is a dangerous poison. It may deaden the nerves so that the person who takes it will go to sleep and never wake up.



11. If a person takes opium many times he soon begins to want to take more opium. In this way an appetite for it may be formed. If a person then yields to such an appetite and keeps on taking opium, it will soon do great injury to his health and to his mind.

12. Soothing syrups that are given to babies to make them sleep contain opium. It is a great wrong to deaden the baby's brain and nerves with opium. When he grows up he will not have so good a brain as he would have had, if the mother or nurse had given him good care,—but no soothing syrup.



### QUESTIONS.

**I.**—1, 2. What alcoholic liquor is made of grapes? 3. How much alcohol is there in wine? 4, 5. Home-made wine? 6, 7. From what is beer made? 8, 9, 10. How is the grain treated? 11, 12. How does the alcohol get in the beer? 13, 14. What is the effect of beer drinking? 15. What is home-made beer? 16. How are the stronger liquors made? 17, 18. What is distillation? 19. What is alcoholic appetite? 20. Why should liquors never be used in cooking?

**II.**—1. From what do men get tobacco? 2. What does the tobacco-plant contain? 4, 5. How does tobacco poison act? 6, 7. What is the effect of the tobacco habit? 8, 9. What is opium? 10, 11. What is the effect of opium poisoning? 12. What are soothing syrups? Their dangerous effects?

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CHAPTER VI.

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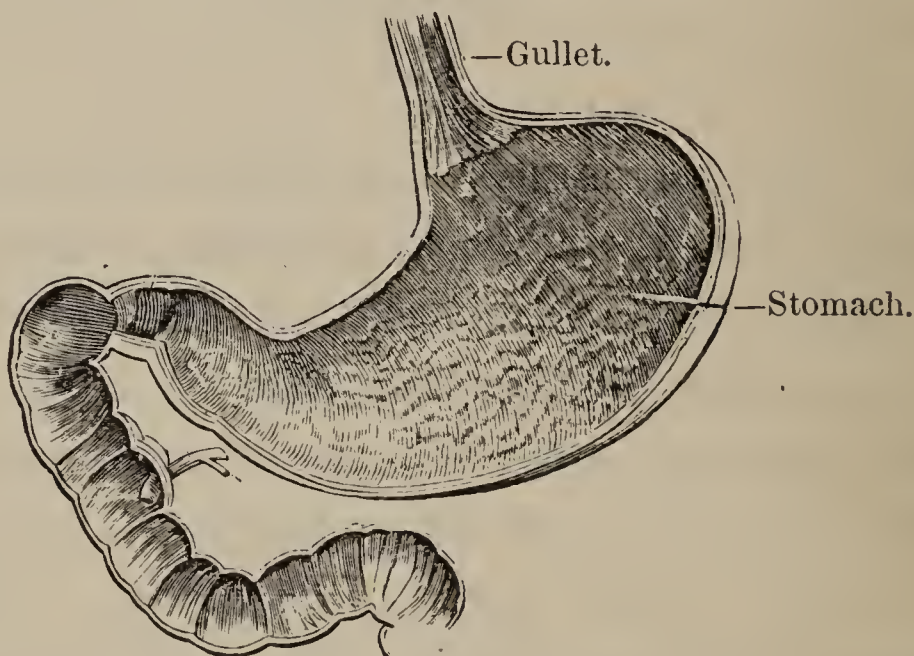
DIGESTION.

## I

1. What becomes of all the food you eat, — bread, butter, pudding, potatoes, apples, sugar, — where do they all go to? There is nothing in you that looks like any of those things, and yet they have all gone into your body. But when you eat them they are changed.

2. You know how blood looks. Can you believe that nearly all the food you eat becomes blood in a few hours? It is a wonderful change! If you should visit a paper-mill you might see logs of wood going in at one door, and in another part of the building you would see piles of white paper which has been made from the logs. This is remarkable, and yet it is not so strange as the making of blood from food. But that is what our bodies are doing all the time.

3. The change which prepares the food to become blood is called digestion. When you swallow your food, you think nothing more about it if you are well. It is like dropping a nickel into a tin savings' bank, or pouring water into a pipe which carries it away, you



don't know where. But the body is not like an empty box. Let us try to follow the food in our thought.

4. From the mouth it passes back into the throat and is swallowed. The act of swallowing carries it down through the gullet into the stomach. The gullet is a tube about nine inches long. The stomach is a kind of soft, fleshy bag. You find out just where it is when you have a stomach-ache.



5. At the further end of the stomach we find a small tube again. This tube is very long,—as much as twenty feet long, and extends to the lower end of the trunk of the body. Of course such a long tube could not be inside of the body without being coiled up, like a bunch of rope. This long tube, twisted up in a mass, we call the intestines or bowels. The bowels are below the stomach. Throat, gullet, stomach, and bowels make one long canal in which the wonderful work of digestion is done.

6. Digestion begins in the mouth for all solid food. The first act is to chew it. This ought to be very well done. The work of the stomach is much harder when the food is swallowed in lumps.

## II

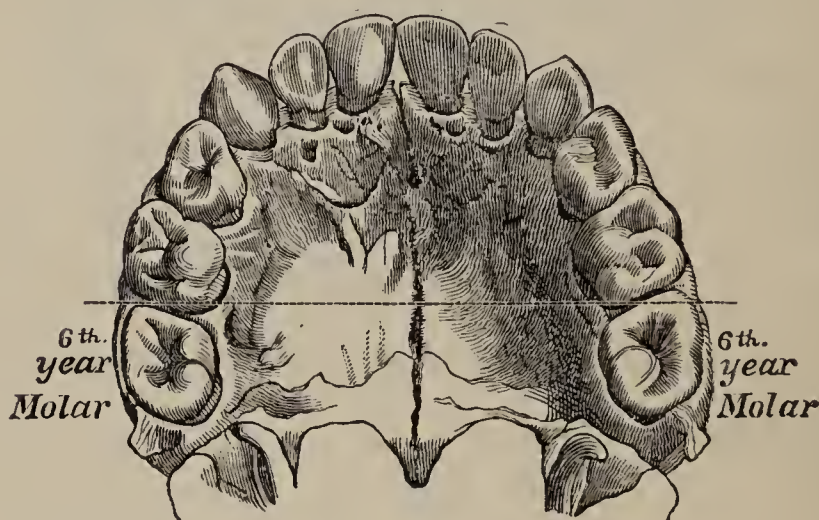
### The Teeth.

1. It is the business of these white strong teeth to do two things. The front teeth, which are sharp, have to bite off the food. The back teeth, which are broad, have to grind it.

2. A little baby has no teeth at first that you can see. But down in his gums there

are some all ready to grow out when the time comes. When the first little one peeps out, everybody is pleased, for it shows that the baby is growing. It does not come until he is five or six months old, and perhaps not till he is eight or nine months old. Then one follows another until he is two or three years old, when he has all his first set.

3. At seven years of age the first teeth begin to come out, and the second set take their



place. One after another the old ones are lost, and the new ones appear until he is twelve or fourteen years old. Even then the "wisdom teeth" have not come.

4. It is very foolish to crack nuts with the teeth, or bite hard candy. If the first teeth break, it may be a long time before new ones

come. If the second teeth are broken, no new ones will ever come.

5. The teeth ought to be cleaned every day with a cloth or tooth-brush. If the teeth are not kept clean, they are more likely to decay. Decayed teeth look bad, and they are a cause of ill-health.

6. After the food is well chewed, it is swallowed and goes down into the stomach. Here it mixes with a watery fluid called the gastric juice. The stomach prepares this juice on purpose to help change the food into blood. The mouthfuls of bread and potato that you swallow are mixed and dissolved in this gastric fluid, until the whole is about like thickened soup. From the stomach some of the food passes into the bowels, and the work goes on there until it is all ready to become blood.

7. Then it soaks into the walls of the bowels or intestines and into the little blood-vessels that are there, and is carried along with the rest of the blood through the body.

8. Some things are easily digested and some are difficult to digest. A dog can digest bones, and a bird can digest buds, that our stomachs



cannot digest. When we eat things that we are unable to digest, it makes us feel bad, and we cannot work or play as well.

9. It is bad for the stomach to have too much rich food, like pie and cake. Too much candy is very bad for the stomach. It is much better to give up the pleasure of eating such things than to have a headache, and to feel no appetite for the next meal.

10. One way to keep good health is to eat only plain and wholesome food. Plain bread, meat and potatoes make good food for children and grown people as well.

11. We must not eat too much even of plain food. If we keep our stomachs full all the time, they will get tired out. They need rest as much as our legs do. It is better to eat at regular times and not to make the stomach work every moment. Do not eat very fast. You cannot chew your food properly if you do. Then it will not be as well digested.

#### Effects of Alcohol and Tobacco on Digestion.

12. If you should get a drop of alcohol into your eye, it would make your eye smart and

look red. The tender lining of the stomach is made red and inflamed, and often made sore by drinking liquors that contain alcohol, such as beer, wine or cider.

13. When these drinks do not make the stomach sore, they often weaken the gastric juice, so that it cannot act upon the food as it should.

14. Men who smoke or chew tobacco often lose their appetite for good food. This is because the tobacco weakens the stomach, and makes it unable to digest food as it should. Such people are seldom as strong, and are not apt to have as good health, as those who do not injure themselves in this way. If you wish your stomach to keep well and do its work well, you should never use tobacco.



#### QUESTIONS.

I.—1, 2. What becomes of our food? 3, 4, 5. What are the organs of digestion? 6. How may we aid digestion?

II.—1. What is the use of the teeth? 2, 3. When do the teeth first appear? 4, 5. How should we care for the teeth? 6, 7. How is the food changed to blood? 8, 9, 10. What is the best food for children? 11. Give some rules for eating? 12, 13, 14. What are the effects of alcohol and tobacco on the stomach?

## CHAPTER VII.

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### THE BLOOD.

#### I

1. Our bodies contain a good deal of blood. It is in almost every part of the body. If you prick yourself or cut yourself anywhere, the blood will run.

2. Blood gives the skin its healthy color. It makes your cheeks rosy and your lips red. When there is not enough blood in the body the face is pale, and we see at once that the person is not well.

3. No one can be well who does not have enough blood. No one can be well whose blood is not pure. The blood is one of the most important parts of the body. Life cannot go on without it. Health and strength depend upon it.

4. In some places where it seldom rains, people have to bring water to the fields and



gardens through ditches. If anything happens to stop the supply of water, the grain and flowers will dry up and die.

5. The same thing will happen in the body if anything stops the flowing of the blood. The blood waters all parts of the body, and carries food to all parts.

### The Blood-Vessels.

6. Although the blood will always run if you cut your flesh, it is all contained in tubes which we call blood-vessels. Some of these are large, and some are smaller than a hair; and the body is so full of them that when you cut yourself anywhere you cut a blood-vessel, and that lets the blood flow out.

7. If you live in a city, or a large village, you have water brought into your house by pipes. There are small pipes going to the different rooms, and these come from a large pipe in the cellar. This pipe comes from a greater pipe in the street, which comes from the reservoir.

8. The blood-vessels in the body are somewhat like these pipes. From the heart two

large tubes go out as pipes do from a reservoir. From these come smaller tubes, and so the tubes keep dividing and growing smaller until finally the blood is carried into every nook and corner of the body, just as the water is carried into every house.

9. But these water-pipes are very different from the blood-vessels. When the water enters the houses, it is drawn off and emptied into other water-pipes and does not go back to the reservoir. But the blood which flows from the heart to face, arms, hands, feet, and all other parts of the body, flows directly back again, not through the same tubes, but through other tubes called veins.

10. Arteries carry blood away from the heart; veins carry blood back to the heart. So the blood goes around and around, and makes what we call circulation.

#### Effects of Alcohol.

11. The healthy blood-vessels are tough and elastic, in order to hold the right amount of blood as it moves through them to all parts of the body. Alcohol weakens the blood-ves-

sels; it makes them stretch, and that lets too much blood go where it ought not.

12. Perhaps you have heard men talk about taking a drink on a cold day "to warm them up." The drink they take causes all the little blood-vessels which lie just under the skin to stretch so much, that they hold more blood than they ought.

13. Then the warm blood comes rushing into them and makes the skin feel warm. The man thinks he is warmer; but he soon finds that he is growing colder. Why? Because the blood cools off faster when it is in the blood-vessels, near the outside of the body, than when it is in those deeper down in the flesh.

14. Alcohol makes people who drink it colder instead of warmer. A person who takes a drink of this kind, and goes out in the cold, will freeze sooner than one who goes out without such a drink.

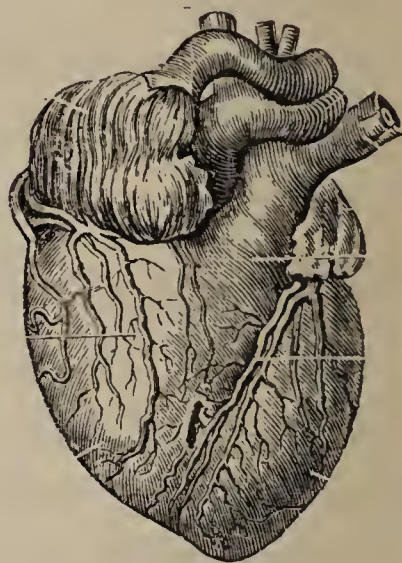
15. Alcohol often makes oily or fatty spots form in the blood-vessels. In these and other ways, any drink that contains alcohol may injure the blood-vessels.



## II

## The Heart.

1. The heart is in that part of the body which is called the chest. It is behind the breast-bone and ribs, on the left side. If you put your ear close to some one's breast you can hear the heart beat. If you watch the bare breast closely, you can see a little movement of the skin on the left side of the chest every time the heart beats.



2. It is always beating. It does not stop when we are asleep or resting. It throbs, throbs, as long as we live. When it stops death comes.

3. If you examine the heart of an ox or of a sheep you will find that it is not solid but hollow. You will find, too, that it is divided by partitions into four chambers. It is made of lean meat called muscle, and when it beats it shuts up close just as your fist closes when

you squeeze something. The heart of a man is quite like a sheep's heart.

#### What Keeps the Blood Moving.

4. The heart keeps the blood moving. I said that the heart is something like a reservoir. But it is more like the bulb of a syringe. When you squeeze the bulb the water flows through the tube. So when the heart squeezes itself, the blood flows out through the arteries and back through the veins. As long as the heart beats the blood keeps moving.

#### Alcohol and Tobacco.

5. If the heart were made of fat, instead of lean meat or muscle, it would not have strength to squeeze out the blood and send it to all parts of the body. When people drink beer, wine, or other alcoholic drinks, some of the lean meat or muscle of the heart often becomes changed to fat. This greatly weakens the heart.

6. Drinks containing alcohol also make the heart weak by causing it to beat faster than it should, thus tiring it with overwork.

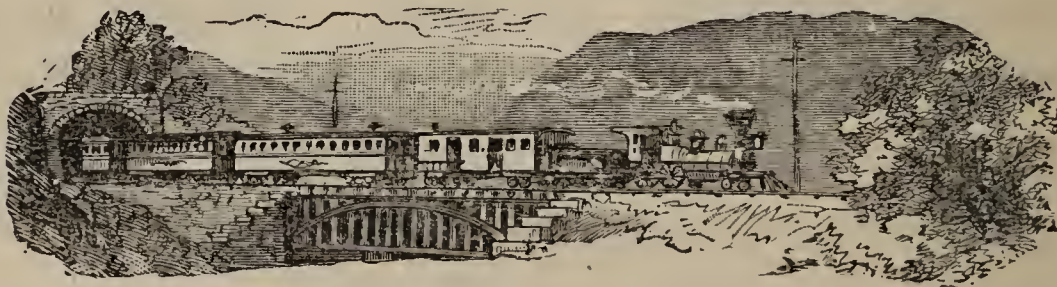
7. Boys who use tobacco seldom have sound

hearts. A doctor once examined thirty-eight boys who smoked. He found that thirty-two of those boys had unhealthy hearts. They all gave up their tobacco, and at the end of a year were entirely well.

Why must the Blood keep moving?

8. You learned that the food is digested in the stomach and bowels. But all parts of the body must have some of this food. The head wants its share, and the arms want theirs, and even the fingers and toes must have theirs. So the blood has to carry it to them. If it did not they would starve.

9. In our vast country steam-cars and steam-boats are moving all the time to carry food and other things from one part of the coun-



try to another. The wheat that grows in the West is carried to the East. The oranges and sugar that grow in the South are carried to the North. So the blood carries food and other things to nourish each part of the body.



## III

## Pure Blood.

1. Since the blood has to carry food to every part of the body, it is very important that it should be *pure*. You would not buy meat from a butcher whose meat was mixed with dirt. You would not buy vegetables from a grocer who had poisonous weeds mixed with his greens. Neither do you want your muscles to be supplied with blood that has impurities or poisons in it. In order to keep your blood pure, several things are necessary.

(a) You must have good wholesome food. Food is digested and taken into the blood. If the food is not good the blood cannot be good. If your food is too rich, or if it is not well cooked, the stomach gets tired and cannot do its work well. Then the blood is not properly supplied with food. If you eat too much the blood gets more food than it needs, and that causes sickness.

(b) You must exercise. Running and playing make the blood flow freely through the body. Pools of water that stand still gener-

ally get foul and slimy, while running water keeps clear. The blood also must be kept active or it will not keep pure. It is bad for children to sit still for a long time.



(c) You must have plenty of fresh air. The blood needs good air. We take it in when we breathe. If the air is bad the blood will be bad. The best air is the air out-of-doors, and when you play out-of-doors you breathe in a good deal of it.

#### Effects of Alcohol on the Blood.

2. When cider, beer, brandy, or any such liquor is drank, the alcohol in it quickly soaks

through the blood-vessels into the blood. It there mixes itself through all the blood it finds in the body.

3. Wise doctors tell us that if only a little alcohol is taken, it injures the blood. Even so little as that in a single glass of beer, wine or cider will do a little harm. More alcohol will harm the blood more.

4. The blood of the wine, beer or cider drinker has to carry alcohol as well as food to the head, heart, and every part of his body. It is very wrong to give the blood poisons to carry to the nerves and the bones and muscles when they need food.



#### QUESTIONS.

I.—1, 2, 3. What is the use of the blood? 4, 5. Why must it go to all parts of the body? 6, 7. What are the blood-vessels? 8, 9. What is their use? 10. Arteries. Veins. 11, 12. What is the effect of alcohol on the blood-vessels? 13, 14. The effect of alcohol on the warmth of the body?

II.—1. What is the heart? 2, 3. How is it divided? 4. What keeps the blood moving? 5, 6, 7. Effect of alcohol on the heart? 8, 9. Why must the blood keep moving?

III.—1. Why must the blood be kept pure? How is the blood kept pure? Why do we need exercise? Fresh air? Good food? 2, 3, 4. Effects of alcohol on the blood?



## CHAPTER VIII.

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### BREATHING. — VENTILATION.

#### I

1. A fish cannot live in the air. Take it out of the water and it gasps and dies. A dog or a bird or a man cannot live in the water. Air is as necessary for us as water is for the fish.

2. You cannot see the air, but you can feel it. When you hold your hand in the wind the air presses against it, as the water does when you put your hand in the brook or under the spout.

3. Air is a good deal like water. If we could see it we should see streams of air and waves of air and still pools of air, just as we see streams and waves and pools of water.

4. Usually the air flows gently across the fields and through the streets and into and out of the windows. But sometimes it rushes along, like a roaring river, and blows down trees and houses.

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Why is Air necessary to us?

5. We must have it to breathe, you answer. That is true. Fifteen or twenty times in every minute we take in and breathe out air. We cannot stop breathing. Even when we are asleep we keep on breathing. When the breath is stopped for five minutes the person is dead, and will never breathe again. We can do without food or drink for days, but we must have air all the time.

6. But we have not yet answered the question why we must breathe. It would be very convenient if we were not obliged to. There is some work in breathing. If we did not have to breathe, we should not drown under water, and would not be injured by the bad air so many people have to live in.

7. There is something in the air that our bodies must have constantly. That something is called oxygen. When we breathe, the oxygen goes into our blood and the blood carries it all through the body, and distributes it to each part. At the same time waste matter from the blood goes out into the air.

## II

## The Parts with which we Breathe.

1. We can see the chest swell, and we can feel the air passing into our nostrils or mouths when we breathe, although we cannot see it.

2. The nose is the proper breathing passage. Some form a habit of keeping the mouth open and breathing through it. This is bad. It makes the throat dry, and sometimes sore, to take in great mouthfuls of cold air. The way through the nose is narrow, and the air is warmed and moistened in passing through it.

3. People who sleep with their mouths open snore, and, besides drying their own throats, they disturb their neighbors.

4. From the throat the air goes down into the voice-box. This is so low down that you cannot see it when you look into the mouth. But you can feel it, by putting your finger on the front of your throat. In men it is a hard lump which is called "Adam's apple."

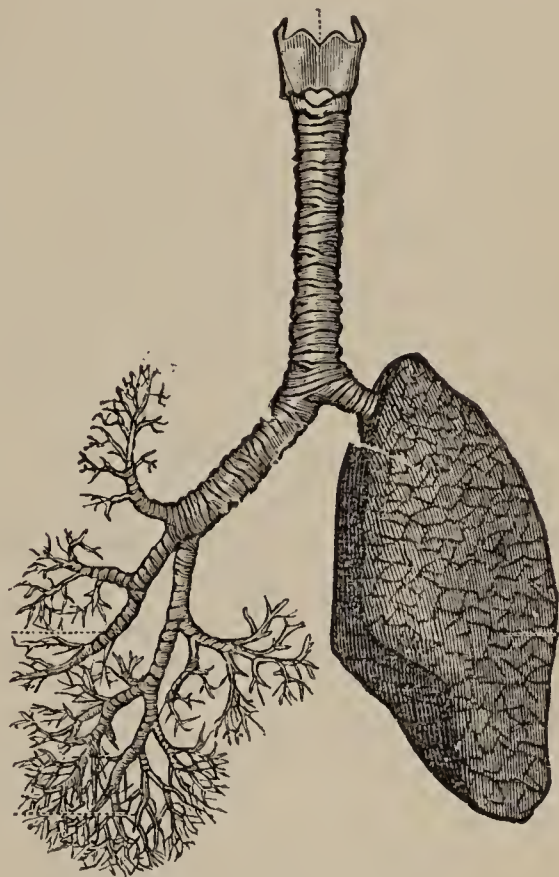
5. In the voice-box the air passes through an opening between two white bands which make the sound. It then goes down the windpipe.



6. The windpipe has little hoops of gristle in its walls to keep it open. For if it should close, our breathing would be stopped.

7. Behind the breast-bone the windpipe divides into two pipes or branches. One of these goes to the right lung and the other goes to the left lung.

8. In the lungs these pipes divide and divide into smaller branches, until the whole of both lungs is full of them. At the end of every tiny twig is a little sac, called an air-sac.



9. Large blood-vessels from the heart also go into each lung. They too divide and divide into smaller branches, until the very smallest lie on the little air-sacs.

10. Now you can see how oxygen from the air gets into the blood. The air goes into the lungs and gets into the air-sacs. The blood goes into the lungs and gets to the tiny

blood-vessels which lie on the air-sacs. And the walls, between the blood and the air, are so thin that the oxygen goes straight through from the air into the blood. And the waste matter comes from the blood into the air-sacs and is carried out in the breath.

11. Did you ever see a pair of bellows? The chest and lungs are very much like the bellows. When you pull the handles of the bellows apart, the air rushes into them. So when your chest grows large, the air rushes into the lungs. When the chest grows small again the air rushes out, just as it rushes out of the bellows when you press the handles together.

12. What becomes of the oxygen in the blood? The blood contains many little red particles which we can see with a microscope, but not without it. These little red particles convey the oxygen. They take it up in the lungs and then go floating off in the blood to all parts of the body, and when they reach the proper place they give it up. So the flesh and skin and bones and all other parts get the oxygen which they need.

## III

## Effects of Alcohol and Tobacco on the Lungs.

1. Have you ever smelled the breath of one who had been drinking beer, wine, or some such liquor? If you have, you remember that his breath smelled so bad that you wanted to turn your head away. This bad odor came from the lungs. The alcohol had passed from his stomach into the blood, which carried it into the blood-vessels in the lungs. The heat of the body had turned the alcohol to vapor. This vapor passed through the little air-sacs in the lungs, and was breathed out with other waste matter.

2. The lungs have enough to do to purify the blood of the waste matters that come to them when no poison has been drank.

3. Alcohol thickens and hardens the thin walls of the delicate air-sacs in the lungs. The waste matter from the blood cannot then pass through as easily into the air-sacs to be breathed out. For this reason, the man who drinks beer or wine or cider or any other alcoholic liquor cannot have as pure blood as the man who never touches any of these drinks.



4. When the walls of the air-sacs are thus hardened by alcohol, pure air cannot as well pass into the blood-vessels of the lungs. This makes the lungs weak, and more likely to become diseased. The man who has such lungs will be more apt to be ill, after taking a slight cold, than a person who has pure blood and sound lungs.

5. The lungs need pure air. A man is not taking pure air into his lungs when he is breathing tobacco smoke. The smoke is an impurity, and it makes the blood impure. Tobacco irritates the lungs, the throat, and the other air-passages leading to the lungs.

#### IV

##### Ventilation.

1. It is not a good thing to breathe another person's breath. It has not enough oxygen, and has too much waste matter. We should not take into our lungs the waste matter which some one else has just breathed out.

2. When a good many people are in a room which is shut up tight, they soon begin to do that very thing. The air that they breathe

is mixed with all the rest of the air in the room, and soon all are breathing bad air. In this way the air in many churches, concert-halls, and theaters becomes so bad that it is very unhealthy. It makes people feel drowsy, or it gives them headaches.

3. If the school-room is not built so that fresh air can be constantly coming in, the doors and windows on opposite sides of the room should be opened for a moment every hour during cold weather, to let the bad air out and the fresh air in. While this is being done, extra heat should be turned on to warm the air coming in, and then the children should march or take exercise, in some quick, active way, to prevent their taking cold.

4. When several people sleep in the same room, without having doors or windows open, the air soon becomes bad. A great deal of sickness comes from breathing impure air.

5. Fresh air is the finest blood purifier. When we run and play, the blood flows fast and we breathe fast, so we take in a great deal of oxygen. That is Nature's way of keeping us well.

6. Ventilation means bringing fresh, pure air into rooms, and driving out the bad air. If we lived out-of-doors all the time, we should not have to think about ventilation.

7. When a room is shut up tight, no air can get in or out, except the little that leaks through cracks. If you open only one window or door a little way, it is not always enough. There must be one place for the air to come in and another for it to go out.

8. It is best for every one, who is well enough, to sleep with a window open in winter and summer. Those who take cold when the window is open must have doors open. An open fire-place is a help to good ventilation.



#### QUESTIONS.

**I.** — 1-4. How does the air resemble water? 5. Why is the air necessary to us? 7. What is in the air that we need constantly?

**II.** — 1-3. What is the proper breathing passage? Why? 4, 5. Where does the air go from the throat? 6, 7. Describe the wind-pipe? 8, 9. Describe its branches? 10, 11. How does the oxygen get into the blood? 12. What does the oxygen do in the blood?

**III.** — 1, 2. What are the effects of alcohol on the lungs? 3, 4. How does it weaken them? 5. What is the effect of tobacco?

**IV.** — 1, 2. What is the need of ventilation? 3. How should school-rooms be ventilated? 4, 5. Sleeping-rooms? 6-8. Give some rules for ventilation?



## CHAPTER IX.

### THE BONES AND JOINTS.

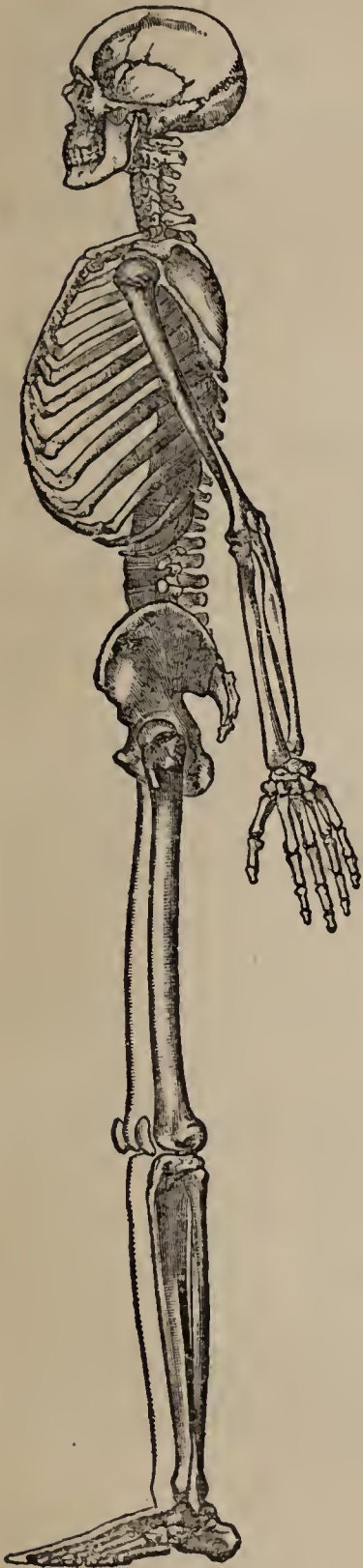
#### I

1. A skeleton is not a pleasant thing to look at, but it is a very important portion of the living body. It is the framework that holds together all other parts. If we had no such hard frame we could not stand up or walk.

2. Bone is hard, and very strong. The bones are fastened together at the joints by tough bands, called ligaments. They are covered over by flesh and skin.

3. Some parts of the body are so tender that they must be surrounded with bone, in order to prevent their being injured.

The brain is one of those parts. We could not bear to have the brain pounded and pressed



as our flesh often is. So it is carefully put away in the skull. The skull is very strong, and will bear a hard blow without breaking.

4. The heart and lungs are protected by the ribs which form the chest.

#### The Joints.

5. There are many joints in the body, and these are of different kinds. Some joints move only forward and backward, like the finger-joints. Others move in many ways like the shoulder-joint.

6. Joints in machinery have to be oiled sometimes, or they will not bend easily. The joints in our bodies oil themselves, and they do not get stiff until old age comes on, if we are in good health.

7. In the toy-shops are wooden figures, which move their limbs and jump or dance when you pull the strings attached to them. These are like the bony skeleton in our bodies, and the strings move them as muscles move the bones.

#### Care of the Bones.

8. The bony frame may be injured in several ways. We often see persons who are deformed

by accident. . They have had some of their bones broken or diseased, and these have not healed in the right position.

9. Others have ungainly figures, for they have been careless, and have had awkward habits in sitting and standing. If a child hangs his head and stoops, instead of standing straight, he will be likely to have a round back and a hollow chest as he grows up.

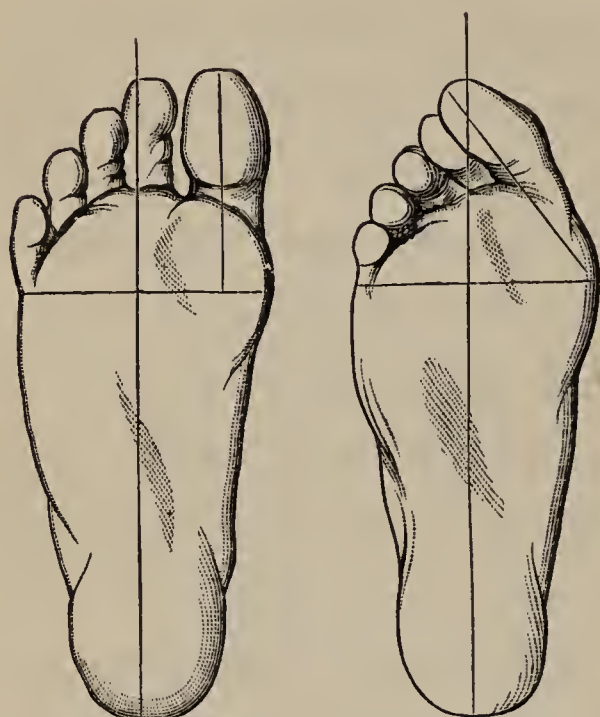
10. We cannot breathe as well with our shoulders forward, and our heads drooping, as we can when the head is erect and the shoulders held back. Whatever hinders our breathing is unhealthy.

11. The human form is noble and graceful. But many people are not satisfied with it and like to change it. You know how the Chinese squeeze the feet of their little girls until they are useless stumps. Some Indians press the heads of the babies to make them flat. Others flatten the noses of their children because they think they look better so.

12. In the United States most people wear shoes that are too short or too narrow, and are not shaped like the foot. The consequence



is, that very few grown people have feet that are shaped as Nature designed them to be,



Natural and Deformed Shape of Foot.

or as an artist makes them when he is making a statue. They cannot step and walk gracefully with feet so squeezed and put out of shape. Shoes should be made to fit the foot and give it room to move freely. This is more important than to have them in the fashion.

13. Many silly young women wear tight clothing that pinches their waists, and makes them look as if they would break off. This kind of a waist looks well in a wasp, but not in a woman. Every wise girl wants to be a strong, healthy woman, and not a weak, sickly, wasp-waisted one.

14. We cannot be healthy unless the liver, stomach, and other organs inside the body have room enough. They ought not to be

crowded by wearing dresses or coats that are too tight about the waist or chest.

#### Effects of Alcohol and Tobacco.

15. If you could have your choice which would you rather be,—a large, strong man or a small, weak one? A large strong one you say at once. Well, then, you should never chew or smoke tobacco. Doctors agree that the boy who smokes or chews tobacco is very liable to stunt his growth and make himself weak by it. The bones need good blood when they are growing. And no blood can furnish good building material for the bone if it is poisoned with tobacco or alcohol.



#### QUESTIONS.

I.—1. What is a skeleton? 2. Bones. How are they fastened together? 3, 4. How is the brain protected? The heart? The lungs? 5. Joints. Describe their use? 6. How are joints kept in condition? 8, 9. How may the bones be injured? 10, 11. What are some effects of injury to the bones? 12. How are the feet sometimes injured? 13, 14. Effects of tight-dressing. 15. Effects of alcohol and tobacco.

## CHAPTER X.

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MOTION.

## I

1. A man walking one evening by a wood, as it began to grow dark, stopped suddenly, trembling with fear. He thought he saw a bear coming out of the bushes just before him. After standing a few minutes he laughed and said, "I was mistaken. It is only a stump of a tree that I see, and no bear."

2. How did he know that it was not a bear? Because he saw that, while he watched it for a whole minute, it *did not move*. A stump or a rock or anything without life is still. But living things very seldom keep perfectly still for a minute. An animal will move its head or its tail or its body just a little perhaps, so that you can see that it is alive. It is very hard for a child to keep quite still for a half of a minute, as you will find if you try it.



3. This is a wonderful thing, if you stop to think about it,—that you and I and all animals can move as we wish. Stones cannot, nor can trees. Even an engine cannot move unless the engineer makes a fire in it, and gets up steam to move it. But we move in any way we wish to by our own power.

4. Nobody knows exactly how we do it, but we know something about it.

5. If you lay your left hand on your right arm above the elbow, and then raise your right hand toward your shoulder, you will feel the flesh of your arm grow hard and swell up.

6. If the skin were off from your arm you would see that the mass of red flesh, which has been growing hard and swelling, has at one end a white cord fastened to a shoulder-bone, and at the other end a cord which is fastened to a bone of the arm below the elbow.

7. This mass of flesh is called a muscle.

8. What we call lean meat is muscle. The trunk of the body is covered with muscles; they make the principal part of the arms and legs. The skin covers them, but you can feel and see them moving under the skin.

9. Muscles differ in shape. Some are flat, and some are round. Nearly all of them end in cords or bands, called tendons, and nearly all are attached to two different bones.

10. When the muscle on the front part of your arm on which you laid your hand grew hard, and swelled up as you bent your elbow, it was growing shorter and thicker. It is in that way that every muscle moves. It grows shorter and thicker.

11. You have seen a caterpillar making his way over the ground. His body grows short and thick and then stretches out at full length. It is somewhat in that way that a muscle grows short and thick.

12. Now, since each muscle is attached to two bones,—one at each end,—what happens when the muscle grows shorter? Of course the two bones must come nearer together. The muscle pulls one bone toward the other.

13. The muscle on your arm, on which you laid your hand, pulls the bone of the arm to which it is attached up toward the shoulder, where the other end of the muscle is attached.

14. All the muscles are so placed that there

is a muscle to pull a bone in one direction, and another to pull it in the other direction. They work opposite to each other.

15. There are five hundred muscles, and it is by these muscles pulling the bones in different directions, that we walk and run and make all our movements.

16. We learn to use our muscles soon after we are born. This is one of the things a baby is doing all day long. He has to use a good many muscles when he walks; but after he begins to try, he learns in a few days.

## II

### Exercise.

1. Muscles grow by exercise. The Creator puts it into the minds of healthy children to want to run and play a great deal. That is because He wants their muscles to grow and be strong and active.

2. The muscles in the arm of a ball-player grow large. So they do in men and women who work with their hands. It may not be necessary for you to have large muscles, but they ought to be well-trained and active.



3. Sports and games in the open air are far better for the health and for the muscles than games in the house.



4. When recess comes, do not sit still and read or talk, but go out-of-doors and play.

5. But do not play too long or too hard. Children sometimes do harm to themselves by playing until they are too tired, or by trying to do things that are too hard for them.

### III

#### Effects of Alcohol and Tobacco.

1. The blood should carry food to the muscles to make them strong. Good food and

plenty of exercise in the open air make your muscles strong and healthy for work or play. If a person drinks alcoholic liquors his blood will carry alcohol, which is a strong poison, to all the muscles of his body. Alcohol makes the muscles weak and unhealthy. .

2. Alcohol often makes too much fat form in the muscles. That weakens them. Beer is especially bad for the muscles, because it tends to load them with fat. The beer-drinker may think the beer is good for him, because it makes him grow fat; but he is mistaken. It is a flabby and unhealthy fat that makes him weaker, not stronger.

3. The man who has used no beer or other alcoholic drinks, but has made his muscles strong by good food and exercise, can do a better day's work than a fat, heavy beer-drinker. When he is ill, his chances of getting well are better.

4. Some men think that beer makes them strong, but it does not. Workmen cannot do as much work when they use beer, or any other alcoholic drinks, as when they do not. Soldiers cannot march as well when they use

these drinks. Few men can lift as much after taking such a drink as before.

5. The drinker often boasts of his strength, because the alcohol dulls his mind, and he does not know how strong or weak he is.

6. Tobacco makes weak and unsteady muscles. The boy who smokes or chews tobacco often seems to need something to hold him up. At school he leans on his desk when he stands, and lounges in his seat when he sits. He acts as he feels, for the tobacco has made his muscles weak.

7. A boy who wants to be strong and bright and active must not poison his blood and his muscles with tobacco.



#### QUESTIONS.

**I.**—1. Is it hard for us to keep still? 2. How can you tell an animal from a stump? 3-5. Describe some of our motions. 6-8. What are muscles? 9. Their shape. 10, 11. How does a muscle move? 12, 13. How are muscles attached to bones? 14, 15. How do muscles act in pairs? 16. How do we learn to use our muscles?

**II.**—1, 2. How do muscles grow strong? 3-5. How should children improve their muscles?

**III.**—1, 2. What is the effect of alcohol on the muscles? 3-5. How does it weaken them? 6, 7. The effect of tobacco on the muscles.



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CHAPTER XI.

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BRAIN AND NERVES.

## I

1. A workman who was laying bricks on a new building dropped one, and it fell on the head of a woman who was passing. She sank down on the sidewalk, and the people who ran to help her up thought at first that she was dead. She was pale and limp, and did not move. But they soon saw that she breathed, and after a while she opened her eyes and asked what was the matter?

2. Can you answer that question? Of course you know that she was struck on the head by a brick and was stunned. But what is it to be stunned? She was not cut, for she had a hat on which protected her. No bones were broken. You could not find a bruise, except a little swelling on the top of her head. She walked home after resting a while. She was

stunned. That means that her *brain* was shaken and hurt, so that she could not move and did not know anything for some time.

3. The brain, as you know, is in the head. By it we know and think and feel and resolve. The brain directs the muscles and makes them work together. Though all other parts are perfect, if the brain stops acting every other organ in the body will soon stop.

4. The skull is the strong, bony box which keeps and protects the brain. The brain is white and about as hard as new cheese.

5. In the bottom of the skull is a hole an inch wide. It is the largest opening into the skull. Through this hole a round cord from the back of the brain passes down into a canal in the backbone. This is the spinal cord. It is white like the brain and of about the same hardness.

6. The backbone protects the spinal cord. If the spinal cord is seriously injured, one does not lose his senses as when the brain is injured, but all the parts below the place of injury are *paralyzed*. The legs cannot move and sometimes there is no feeling in them.

7. Little white cords or threads come out of the brain and go through small holes in the skull to the muscles and the skin, and also to the eye and ear and nose and tongue. Other white threads come from the spinal cord and go to all parts of the body. These white cords are the *nerves*.

8. In a hotel or large private-house there are bells and speaking-tubes that go up-stairs and down, so that the master of the house, sitting in his library, can get a message from the kitchen, or send one there without going himself. The nerves carry messages to and from the brain, which is the ruler of the house of life.

9. If you cut your finger, you are sure to cut some of the ends of these nerves. For they divide into very small fibers; some of them no larger than a spider's thread, and go to every part of the skin. The cut nerve carries a message up to the brain that there is a knife down there. The brain sends back the message through another nerve to the muscles to move the finger; and instantly your finger is jerked away from the edge of the knife.



### Effects of Alcohol and Tobacco.

10. Have you ever heard of a person having no feeling in his hand or arm or other part of his body? If his hand should touch a hot stove, or a needle should be sticking into him, he would not feel it. That is because something is the matter with his nerves.

11. Sometimes the nerves that should guide the muscles to move become deadened, and then the person cannot walk or move his limbs. The nerves are sometimes deadened by poisons that people take into their bodies. The alcohol in wine or beer is one of the poisons that deadens the nerves. Wine will sometimes make a man stagger when he walks. Why? Because the alcohol in it deadens the nerves and brain so that they cannot make his muscles move properly.

12. You may have noticed that the hands of the drinking man often tremble. He cannot hold a glass of water steadily. He would take a long time to thread a needle. This is because he has deadened his nerves and brain again and again with alcohol, and made them unfit

to control the muscles. At last they become unable to hold his muscles steady at any time. If he should stop drinking entirely, he might in time be well again.

13. Two men are working side by side in a watch factory. They need very steady nerves to guide their fingers in doing their fine and delicate work. One drinks beer, the other does not, but drinks water or milk. The fingers of the beer-drinker are quite unsteady, because his nerves and brain are partly deadened with alcohol. He is made dull and stupid by the alcohol the beer contains, and he cannot do as good work as the other man. The water and milk which the other man drinks do not deaden his senses or make his brain stupid. Water and milk feed his brain, and make his nerves steady and strong to guide the muscles in his hands. Where this man succeeds, the beer-drinker fails.

14. The boy who drinks beer, wine or cider will not be able to throw the ball in a game with so steady an aim, or to do anything as well as he might have done, if he drank no liquor that contained alcohol.

## II

## Care of the Brain.

1. Everything that is healthful is good for the brain. Good food helps to make a good brain. Food or drink that hurts the stomach hurts the brain.

2. The brain cannot keep working all the time as the heart does. It gets tired. When night comes, it needs to go to sleep for eight hours. Sleep is the rest of the brain.

3. Children commonly like to sit up late; and grown people often take less sleep than they need. Children need more sleep than grown people,—they should go to bed at a regular hour, and that an early one.

## Effects of Alcohol on the Brain.

4. There are many blood-vessels in the brain, and much blood passes through them to feed the brain. Alcohol makes the blood-vessels stretch, and then too much blood flows to the brain.

5. Whenever a man takes a glass of beer or other liquor that has alcohol in it, the blood carries the alcohol to his brain.



6. If this alcohol were like water, it would not harm the brain, for the brain needs water. But alcohol is a sharp, biting poison. It will shrink the brain and do it much other harm. The brain was made to think with, but no person can think so well when his brain is shrunken with alcohol.

7. With the brain we think about what is right or wrong. With the brain we think kind and loving thoughts of our parents and friends. A person whose brain is shrunken with alcohol will not be apt to care what he does or says, or for the friends he ought to love. The poison, alcohol, has taken away his power to think what he ought to do.

8. A man poisons his brain a little, if he takes only the alcohol there is in a little beer or cider. When he takes enough to shrink and harden his brain until he does not know what he is about, he is poisoned still more.

9. By ruining the brain alcohol ruins the mind. A man who has been drinking usually talks foolishly. His good sense is gone, because his brain is poisoned. He is sometimes very cruel.

10. You have heard of men who are put in prison for doing bad deeds. Nine out of every ten of these men were led to do these bad deeds by drinking some alcoholic liquor. This shrunk and hardened their brains, until they did not know or care what they did.

11. Tobacco is also a poison that deadens the brain. Boys who use tobacco are apt to have stupid brains, and they do not usually learn their lessons as well. They do not become as wise men as the boys who never use tobacco.



#### QUESTIONS.

I.—1, 2. What is the effect of a severe blow on the head? 3. What is the brain? 4-6. Describe the skull. The backbone. The spinal cord. The nerves. 8, 9. How do the nerves carry messages? 10, 11. Tell what alcohol does to the nerves. 12-14. How does it weaken their action?

II.—1. How is the brain kept healthy? 2. Why do we need sleep? 3. What are good rules for children? 4-6. What is the effect of alcohol on the brain? 7, 8. On the morals? 9, 10. On the character? 11. What is the effect of tobacco on the brain?

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CHAPTER XII.

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## THE SKIN.

## I

1. The skin is a beautiful covering for the body. It is smooth and delicate, but firm and strong. The red blood in the fine blood-vessels in the skin gives it a rosy tinge that is very attractive. It fits wonderfully well, and much better than the gloves or clothes that you wear over it. In youth it has no wrinkles, but is smooth everywhere and yet in a well person it is never tight. A new jacket or gown often pulls under the arms, so that you cannot move your limbs freely. But the skin never hinders your movements.

2. After we have worn it a good while—fifty or sixty years—it does not fit as well. We shrink away from it, and it wrinkles. But this seldom happens to children.

3. The skin keeps the body warm. It is not sufficient for this purpose in cold weather,



though the cows and horses and dogs get along very well without clothes. Their skins are thickly coated with hair, and hair is an excellent protection against cold.

### The Hair and Nails.

4. Hair grows from our skin also. Not only on the top of the head, but on the whole surface there is hair. Over most of the body it is so short and fine that it is scarcely seen. Nature has given man a mind which makes him capable of clothing himself. But to her humbler children, the dogs and other animals, she furnishes a warm outer covering.

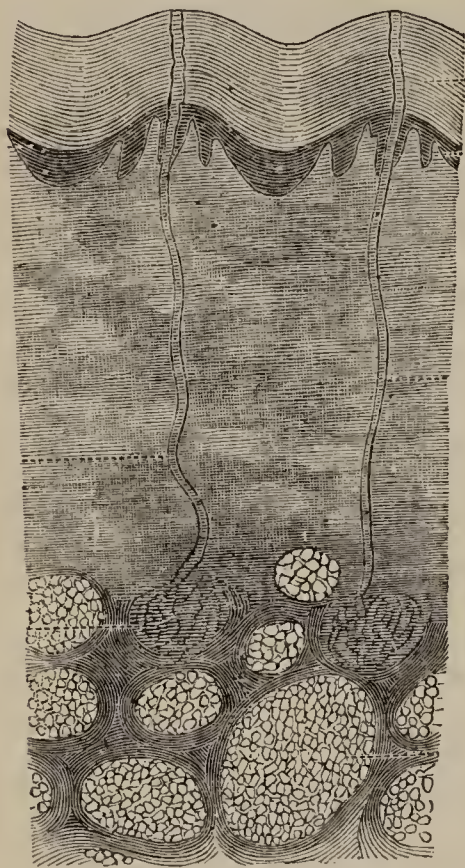
5. The nails, too, grow from the skin. They are little plates of surface skin, which are hard and smooth, and are situated on the backs of the ends of the fingers and toes. It is easy to see what they are for, if you think a moment. Pick up a small object with finger and thumb and hold it tight. If there were no nails there, and the ends of the fingers and thumb were quite round and pulpy, you could not pick up things as well or hold them as firmly or feel as delicately.

6. A hard, rough hand is not so beautiful as a soft one. But we know that such a hand has done work, and work is honorable. The hands of thieves and idlers are not hard. We should respect the hand that is marked by toil, especially if it has been toil for us.

7. Besides being a cover for the body, the skin has other uses. When we are well, it is always a little moist. If you touch the face of one sick with a fever, and then of a well person, you would notice a great difference. One is hot and very dry, the other cool and moist. Everywhere, on the surface of the skin, are little openings called pores. They are so small that you cannot see them without a magnifying glass. But there are a great many of them, — one or two thousand on a square inch. These pores are the openings through which perspiration oozes out. It is coming out all the time when we are well, but ordinarily it turns into vapor as soon as it reaches the surface and we do not see it. When we run or exercise hard, it comes faster.

8. These pores are very small, but we can imagine ourselves small enough to look into

one as a man looks into a well. What should we see? If we had a light we should see a tube, not straight, but winding like a cork-



screw, and going down deep into the skin. Now, if we followed the tube downward, we should see that just under the skin it was rolled up in a ball, and that on the outside of this ball many little blood-vessels lie in a network. From these little blood-vessels comes the water into the tube, and so out to the surface.

As much as a pint of water goes off from the body in this way every day.

9. It makes us cooler to perspire freely, for perspiration turns to vapor on the surface of the body. But when water turns to vapor, it takes away heat from everything near it. That is the reason why sprinkling the street on a hot day cools the air. So water turning to vapor on the skin cools the skin.



fortunate not to be able to smell a rose or a field of clover. And it is better to be able to smell bad things, if they are near us, for then we can remove them or go away from them.

## II

### The Eye.

1. The eyes are like windows through which our souls look out. Shut your eyes and how much is gone; the light and the sky, and the fields and the trees, and the faces of your friends. Open them again, and all these things come back to you.

2. When we look at anything, a little picture of that thing is made in the back part of the eye. This picture remains only while we are looking. There is always a picture of something there, if the eyes are open. The nerves of the eye tell the brain what this picture is.

3. Since our eyes give us so much happiness, and since they are so necessary to us, we ought to be careful of them. You may do them harm in several ways.

(a) One way is by reading or studying with a bad light. Children sometimes sit by the

cold, because the skin is too sensitive. It is covered with clothing, and often we spend our time in warm rooms and the skin cannot endure cold air. When a draught strikes us, the skin gets chilled. People who live out-of-doors a great deal do not get cold as easily as those who are shut up in the house. So a daily bath makes the skin hardier. A good time for a bath is just after rising.

7. It is pleasant and healthful in the summer to bathe in a brook or pond or in the sea. But some rules should be observed.

(a) Never go into the water when very hot. It may cause a shock to the system that is dangerous. Wait and cool off before you plunge in.

(b) Never go into the water immediately after eating. It sometimes stops digestion, and causes sickness.

(c) Do not stay in the water too long. Your bath should never last more than half an hour, generally much less.

(d) Do not go in the water more than once or twice on the same day.

8. For those who cannot bathe often, a "dry

bath" is a good thing. That means rubbing the body thoroughly with a towel or a brush.

#### Effects of Alcohol upon the Skin.

9. A clear skin is beautiful. But you have seen faces whose skin was made coarse and even loathsome to the sight by intoxicating drinks. Red blotches show that their blood-vessels have been weakened by alcohol, and are always larger than they should be. Sores sometimes break out, especially on the drinker's nose, which becomes swollen and red. The skin of the daily tippler often breaks up into dead scales that stop up the openings of the little pores, through which the perspiration should pass out.

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#### QUESTIONS.

I. — 1, 2. Describe the skin. 3. What is its use? 4. The hair. 5. The nails. Their use. 7. What other uses of the skin? 8, 9. Describe the pores. Perspiration. Its use.

II. — 1. How is the skin kept in good order? 2, 3. Need of bathing. 4-6. Good effects of bathing. 7, 8. Give some rules for bathing. 9. What is the effect of alcohol on the skin?



## CHAPTER XIII.

## THE SENSES.—THE EYE.—THE EAR.

## I

1. By our senses we find out about things all around us. We have five senses, —touch, taste, smell, sight, and hearing.

2. We learn a great deal by the sense of touch. A baby is eager to touch everything he sees,—even the moon. He finds out by feeling whether anything is hard or soft, or round or flat, and much beside. People who are blind sometimes can do wonderful things by feeling. We can feel with every part of the outside of the body.

3. We need to taste only the things we eat, so we can taste with the tongue, the mouth, and the throat, and with no other part.

4. We smell with the nose. When we have bad colds we cannot smell; and some people lose their sense of smell entirely. It is un-

fortunate not to be able to smell a rose or a field of clover. And it is better to be able to smell bad things, if they are near us, for then we can remove them or go away from them.

## II

### The Eye.

1. The eyes are like windows through which our souls look out. Shut your eyes and how much is gone; the light and the sky, and the fields and the trees, and the faces of your friends. Open them again, and all these things come back to you.

2. When we look at anything, a little picture of that thing is made in the back part of the eye. This picture remains only while we are looking. There is always a picture of something there, if the eyes are open. The nerves of the eye tell the brain what this picture is.

3. Since our eyes give us so much happiness, and since they are so necessary to us, we ought to be careful of them. You may do them harm in several ways.

(a) One way is by reading or studying with a bad light. Children sometimes sit by the

window and read when the sun is going down. They keep on until they can hardly see. This is not treating the eyes well. It is tiring them and straining them.

(b) Another bad habit is that of reading while lying down. This also makes the eyes weak.

(c) Many children lean over their desks when they study, with their faces close to the book. This often makes them short-sighted, so that after awhile they have to wear glasses to see across a room.

(d) In the evening we should not sit and read with a lamp directly before our eyes. It should be behind or at one side of us.

### III

#### The Ear.

1. The eye is in plain sight on the face, but the hearing part of the ear is deep in the skull. The part that we see on the side of the head is only the open end of a tube that leads to the hearing part. It is like an ear-trumpet. The wide end catches the sound and carries it in.



2. This outside ear is not made to be pulled, and should never be boxed. It should be washed with a soft rag on the finger, but no one should use hair-pins, or any such things, to clean his own ears. It is not safe to put them into the ear. At the end of the tube of the ear, which is an inch long, is the drum-head. This is not much thicker than paper, and is stretched across the tube. It may be broken by a hard blow on the ear, or even by a very loud sound, such as a cannon makes when fired near us.

3. Still further in the skull, just beyond the drum-head, is the place where lies the nerve of hearing. This is the most important part of the ear. The nerve carries to the brain the message which the sound brings.

#### Effects of Alcohol and Tobacco.

4. The eye-sight is often injured by the use of alcohol and tobacco. Doctors tell us of men who were rapidly losing their sight from the use of these poisons; but when they stopped using them, their eye-sight was soon restored again.

5. Cider, beer, wine, or any liquor that contains alcohol, deadens the nerves that give us the sense of taste. One who drinks any of these, or uses tobacco, soon becomes unable to taste delicate flavors.

6. When the brain is dulled by alcohol, all the senses are dulled also. The person cannot hear as quickly, see as clearly, taste, smell or feel as keenly as when there is no alcohol in his brain, and his nerves are not poisoned and blunted by it.

7. Our senses are designed to bring us much pleasure. But one who benumbs them with alcohol or tobacco loses far more true pleasure than the use of such poisons can give him.

8. Boys and girls who have good health, clear brains, and who are determined to do right, have a fortune in themselves.



#### QUESTIONS.

**I.**—1. How many senses have we? What are they? 2. The sense of touch. 3. Sense of taste. 4. The sense of smell.

**II.**—1. The sense of sight. 2. How do we see with the eyes? 3. Give some rules for the care of the eyes.

**III.**—1. The sense of hearing. 2. How should we care for the ear? 3. Describe the inner ear. 4–8. What are the effects of alcohol and tobacco on the eye-sight and other senses?









